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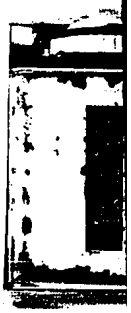

USSR CONFERENCE ON NEW WELDING METHODS, 1952

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The All-Union Conference on new welding methods developed by the Institute of Electric Welding imeni Academician Ye. O. Paton was held in Kiev on 4-6 July 1952. About 200 representatives of ministries, plants, and institutes attended the conference, which was opened by G. N. Savin, Vice-President of the Academy of Sciences Ukrainian SSR.

Academician Ye. O Paton stated in his speech that the USSR has advanced to first place in the world in the field of application of automatic welding and that, in numerous fields of welding science and technique, Soviet scientists and manufacturers are ahead of those in other countries.

V. Ye. Paton, Corresponding Member, Academy of Sciences Ukrainian SSR, in his report "Achievements and Tasks in the Field of Welding Under Flux," indicated that potentialities of automatic and semiautomatic welding under flux are still not being fully utilized, and further mechanization of the welding industry will be, in general, developed along the lines of this welding method.

The following works of the Institute of Electric Welding and other organizations were noted in Paton's report:

Automatic and semiautomatic welding with thin electrode wire was developed by the institute jointly with the "Elektrik" Plant; application of thin wire and increased current densities introduced radical qualitative changes into the metallurgy and the technology of welding under flux.

Multiple-electrode and multiple-arc automatic welding has acquired wide industrial application in manufacturing pipes of large diameters. The method of three-phase welding was suggested by Prof G. P. Mikhaylov, Doctor of Technical Sciences.

New high-quality fluxes for automatic welding were developed by institute, TsNIITMASh, and other organizations.

Concluding his report, Paton stated that the decisions of the previous conference, held in the institute 5 years ago, have been basically fulfilled. However, he made a number of critical remarks about the activity of the institute, indicating delay in certain fields, such as the development of technology for automatic welding of aluminum and its alloys, single-pass welding of circular joints of thick-walled containers, horizontal joints on a vertical surface, etc.

A report entitled "Welding of Vertical Joints by the Method of Forced Formation" was delivered by G. Z. Voloshkovich, Candidate of Technical Sciences (Institute of Electric Welding). Voloshkovich emphasized the expediency of this method in welding vertical joints which cannot be brought into horizontal position and in shop welding of joints on objects made of thick metal.

The institute worked out a new method of automatic welding under flux, called electric slag welding, which considerably decreases flux consumption and makes possible a single-pass welding of thich metal. Welding with forced weld formation with both arc and slag processes has a number of advantages, namely, economical indexes in case of thicknesses over 30 mm are better than

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those of flat welding; welding of thick metal is done in a single pass without beveling the edges; there are no angular deformations in butt welding due to the symmetry of seams; there is less tendency to formation of cracks and pores; and welding of pieces of varying thickness is possible.

P. I. Sevbo, Candidate of Technical Sciences, in his report "New Equipment of the Institute of Electric Welding for Automatic and Semiautomatic Welding of Vertical Joints," classified all existing equipment into six types, as follows:

1. Heavy-duty welding machines with vertical guides and a separate electric drive for welding movement.

2. Single-rail, lightweight-type machines with a common electric drive for welding travel and electrode feed.

3. Railless welding machines, mechanically engaged with the workpiece.

4. Railless, magnetic welding machines which are attracted to the workpieces with the aid of electromagnets.

5. Walking magnetic welding machines.

6. Hose-type semiautomatic welders with manual drive of operation travel.

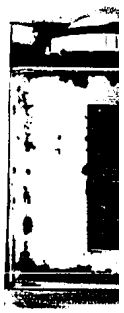
At present, machines of the first three types are of the greatest practical interest.

V. Ye. Paton, Candidate of Technical Sciences, in his report "New Impulse-Magnetic Welding Machines," stated that, in welding on inclined and vertical surfaces, welders that travel directly over workpieces have in most cases considerable advantages over machines whose movement is along guides.

Paton discussed methods of attaching a welding apparatus to a piece to be welded. Mechanical clamping is inconvenient since it requires a considerable gap between edges and complicates assemblage of the workpiece. Magnetic attachment can be effected by magnets in the shape of rollers or flat magnets. The latter variation, called a walking magnetic mechanism, has comparatively large areas of contact between magnets and workpiece, which develop considerable attaching forces.

Walking magnetic mechanisms "walk" along a workpiece by means of electromagnets alternately attracted to the workpiece and can travel along surfaces located in any position. According to Paton, essential features of these mechanisms are their simplicity, low weight and size, considerable traction force, and possibility for smooth regulation of traveling speed; on the other hand, these mechanisms have difficulty in moving over obstacles and have a complicated electrical system.

S. L. Mandel'berg, Candidate of Technical Sciences, presented a report "Automatic Welding of the Vertical Joints in Assembling Welded Bridges," in which he indicated that the progress in the construction of all-welded bridges is based chiefly on a new method for automatic welding of vertical assembling joints. He assumed that the joints and intersections of trusses and I-beams are major assembling welds of all-welded bridges; in the case of plates less than 20 mm thick, which are most used in the members of trusses for all-welded bridges, stabilization of the arc process is attained by application of small-diameter wire and direct current; vertical fillet welds and butt welds of metal less than 10 mm thick are executed with the aid of a copper disk designed by Mandel'berg.



The main trusses of two railroad span structures 66 m long and two highway bridges of considerable length were assembled by welding during 1951-1952.

Three reports on welding with forced weld formation were delivered by representatives of plants which satisfactorily introduced the new technology.

Engineer I. G. Guzenko presented brief information on an experiment for construction of a turbine stator at the Novo-Kramatorsk Plant imeni Stalin.

Engineer I. K. Yermolayev described the practice of welding ax blanks at the Sinel'nikovo Plant of the Ministry of Local Industry, Ukrainian SSR.

Engineer I. D. Davydenko from the "Krasnyy Kotel'shchik" (Red Boilermaker) Plant, in his report on an experiment for vertical welding of longitudinal joints in two thick-walled containers, demonstrated that the new technology considerably increases operating efficiency, reduces costs, shortens the production cycle, and releases shop space.

The report "Fabrication of Welded Pipes of Large Diameters" by R. I. Lashkevich, Candidate of Technical Sciences, dealt with a new method developed by the Institute of Electric Welding imeni Academician Ye. O. Paton for pipe fabrication by automatic welding under flux. The method increased the welding rate to 80-120 m/hr and permitted production of straight-seam pipes of diameters from 420 to 1,420 mm with wall thicknesses from 6 to 14 mm; the welding operation is performed either on semiautomatic installations, where a fixed pipe skelp is welded by a power-driven machine, or on an automatic pipe-welding mill by a stationary welding machine.

According to Lashkevich's report, double-arc welding machines permitted high rates of welding and execution of single-sided butt joints up to 14 mm thick on a flux-copper pad.

Engineer I. I. Andreyev, from the Khartsyzsk Pipe Plant, supplemented Lashkevich's report in his communication "Plant Experience in the Fabrication of Welded Pipes," in which he stated that conversion to automatic welding under flux improved labor conditions and increased productivity, which under the previous conditions of forge-gas welding showed welding rate not higher than 7-8 m/hr.

D. A. Dudko, Candidate of Technical Sciences (Institute of Electric Welding imeni Academician Ye. O. Paton), presented a report on the butt welding of immovable pipes of large diameter, widely used in connection with the intensive construction of gas and oil pipelines in the USSR. Welding in two layers showed good results under laboratory conditions.

N. G. Ostapenko, Candidate of Technical Sciences (Institute of Electric Welding imeni Academician Ye. O. Paton), in his report "New Method for Resistance Welding of Pipe Butts With the Aid of New Type Transformers" described laboratory experiments were sound joints were obtained in welding 127 x 5 and 529 x 8 mm pipes, using power of the order of 0.8 - 1.0 kw/sq cm, which is far below the power required for resistance welding with transformers of the ordinary type.

G. V. Rayevskiy, Candidate of Technical Sciences (Institute of Electric Welding), presented a report "Application of the Metnod of Rolling Up in the Fabrication of Welded Construction," in which he described a new technology developed at the institute for prefabricating bulky plate structures

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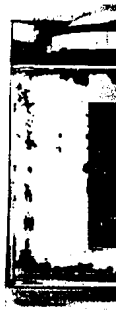

in the form of large construction elements. Large, flat-welded panels are rolled up into compact cylindrical rolls convenient for transportation. This method is adaptable to the fabrication of side walls, bottoms, and roofs for tanks.

Engineer B. V. Popovskiy (Ministry of Petroleum Industry) in his report indicated that the new method for erection of tanks is already widely used in the organization represented by him. He explained that, for hoisting the rolls of the tank wall into vertical position, the institute worked out an adequate method of falling boom and movable anchors which considerably facilitate the fastening of stay wires. The hoisting operation takes only 5-10 minutes.

The operation of unrolling the walls during the erection of tanks, evoking great doubt among installers, was properly and practically solved and now presents no difficulties.

In discussion, after all reports were read, the participants of the conference noted as successful the activity of the Institute of Electric Welding in the field of new welding methods and commended the close contact of the institute with industry; but they also criticized certain institute and plant works.

Engineer S. V. Yunger (Stalingrad Branch of Giproneftemash-[State Planning Institute for Petroleum Machine Building] noted a certain tendency to excessive work on problems of welding steels of very large thicknesses, while the majority of industries use 20-40 mm steel which can be welded without beveling the edges to be welded.

A. I. Khodzhayev (Ministry of Transport Machine Building) indicated that the river shipbuilding plants are in great need of equipment for automatic welding of steel up to 10-mm thickness.

Prof M. K. Gusel'shchikov (NIIMorflota [Scientific Research Institute of the Maritime Fleet] noted that the new method of vertical welding with forced weld formation opens great possibilities for mechanization of welding operations during repair works on seagoing ships.

I. N. Gerasimenko (Podol'sk Machine Building Plant) expressed the opinion that scarcity of equipment hampers wide use of the new method of vertical welding.

Prof N. O. Okerblom (Leningrad Polytechnical Institute) said that progress in the use of new methods of automatic welding cannot be considered adequate. The disproportion between the volume of welding works and the number of specialist-welders, in his opinion, must be eliminated. He recommended that the institute be more active on the problems of welding deformations, particularly when the new method of vertical welding is used.

In conclusion, the conference adopted a resolution recommending further improvement and wide industrial use of the achievements discussed at the conference.

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